Homework 02

Instructions: Upload LEGIBLE, COMPLETE solutions to Gradescope before 11:59pm on 20 September 2021.

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1. Compute an equation of the plane containing the three points $(3, -1, 1)$, $(1, 3, -2)$, and $(-3, 1, 1)$.

2. Compute all points of intersection of the space curve $\mathbf{r}(t) = \langle 2t - 1, t, t^2 + 2 \rangle$ with the surface $x^2 - y^2 - 2z = 1$.

3. Compute the limit $\lim\limits_{t \to -1} \mathbf{r}(t)$ for the space curve $\mathbf{r}(t) = \left\langle \dfrac{\sin(t+1)}{t}, 2\ln(2+t), \dfrac{t^3 - 2t - 1}{t^2 - 1} \right\rangle$.

4. Compute the tangent line to the curve $\mathbf{r}(t) = \left\langle \sin(t), \dfrac{t^2 - \pi^2}{2}, \cos(3t) \right\rangle$ at the point $(0, 0, -1)$.

5. Compute the arc length of the curve $\mathbf{r}(t) = \left\langle 2t^{5/2}, -2t^2, t^2 \right\rangle$ between the points $(2, -2, 1)$ and $(64, -32, 16)$.